

BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 03

2003 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

July 2003



WEB ADDRESS:

<http://www.scdhec.net/water/html/shellfish.html#reports>

2003 ANNUAL UPDATE

[Data Through December 2002]

Shellfish Management Area 03

Shellfish Sanitation Program



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2002 ANNUAL UPDATE
Shellfish Management Area 03
SCDHEC EQC Bureau of Water

Data Inclusive Dates:

01 / 01 / 00 thru 12 / 31 / 02

Classification Change:

 Yes X No

Shoreline Survey Completed: YES

(I)ncreased/(D)ecreased/(N)one:

 N Approved

 N Cond. Approved

 N Restricted

 N Prohibited

Prior Report & Date: Annual-2002

SUMMARY

Area 03 is Restricted in it's entirety. The area is adversely affected by stormwater runoff from various nonpoint sources. Both estuaries serve as drainage basin outlets for the City of Myrtle Beach. The shoreline reconnaissance and bacteriological data review indicate that the present Restricted classification is appropriate. Depuration harvest activities should not be permitted within this area.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47 which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State. This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The National Shellfish Sanitation Program (NSSP) Guide For The Control Of Molluscan Shellfish is used by the United States Food and Drug Administration (USFDA) to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved - Growing areas shall be classified Approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption. Approved area classification shall be determined upon a sanitary survey which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, and not more than ten percent of the samples shall exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved - Growing areas may be classified Conditionally Approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department, prior to classifying an area as "conditionally approved." Where appropriate, the management plan for each Conditionally Approved area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems, evaluation of each source of pollution, and means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved area classification is not feasible. Shellfish may be harvested from areas classified as Restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision. For restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - Growing areas may be classified Conditionally Restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as Conditionally Restricted. Where appropriate, the management plan for each Conditionally Restricted area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems and an evaluation of each source of pollution, and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as Conditionally Restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For Conditionally Restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of Conditionally Restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Prohibited - Growing areas are classified Prohibited if there is no current sanitary survey or if the sanitary survey or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

Area 3 consists of two separate estuaries which serve as major stormwater drainage outlets for the City of Myrtle Beach. Withers Swash is located between 3rd and 5th Avenues South and extends a distance of several hundred yards to the west of U. S. Highway 17. Midway Swash is located near 29th Avenue South. It's small, meandering channel is easily discernable from the ocean outlet to the Myrtle Beach Jetport property. Total combined area of classified shellfish habitat for the two drainage areas is approximately 14.4 acres.

The harvesting classifications of Area 03 prior to this sanitary survey were as follows:

Prohibited:	None.
Restricted:	1) All waters of Withers Swash; 2) All waters of Midway Swash;
Approved:	None.
Approved:	None.

The shellfish industry in South Carolina is based on primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). The South Carolina Department of Health and Environmental Control currently disallows harvesting of oysters and clams within Area 03 for direct marketing purposes. No relay projects have been permitted during the past three-year review period.

Shellfish harvesting season in South Carolina normally extends from September 16 through May 14. The South Carolina Department of Natural Resources (SCDNR) has the authority to alter the shellfish harvesting season for resource management purposes and grant permits for year-round mariculture operations. Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

SURVEY PROCEDURES

Waccamaw District Shellfish Sanitation Section conducted shoreline surveys of Area 03 during the review period. Pollution source assessment activities were also conducted by the City of Myrtle Beach in conjunction with stormwater drainage projects.

POINT SOURCE POLLUTION

- A. Municipal and Community Waste Treatment Facilities** - The majority of the City of Myrtle Beach has central sewer and is serviced by the City of Myrtle Beach. Discharge of effluent from their facilities is to the Atlantic Intracoastal Waterway(Waccamaw River) and does not affect Area 03 shellfish growing waters.
- B. Industrial Waste** - NPDES discharge sites are indicated on the Potential Pollution Sources map. These are groundwater remediation sites which are located on the site of the former Myrtle Beach Air Force Base. Aircraft and automotive fuels are a prime contaminant, as are chlorinated solvents (cleaners, degreasers, etc.). Three of the five sites ultimately discharge to the Atlantic Ocean via Midway Inlet. NPDES storm water permits for land disturbing activities, although not necessarily new pollution sources, are being included in this year's report.
- C. Marinas** - S.C. Regulation 61-47, Shellfish defines Marina as "any water area with a structure (docks, basin, floating docks, etc.) which is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space." There are no marinas located in Area 02 due to lack of navigable channels.

- D. Radionuclides** - Sources of radionuclides have not been identified within Area 02, and radionuclide monitoring has not been conducted.

NONPOINT SOURCE POLLUTION

- A. Urban and Suburban Stormwater Runoff** - ¹The U.S. Geological Survey (USGS), in cooperation with the City of Myrtle Beach, prepared a report concerning enteric bacteria within the Withers Swash Basin. The report, which utilized data collected between 1991 and 1993, noted high concentrations of bacteria. However, due to the sporadic nature of these concentrations, the USGS was unable to define a single source. Likely sources quoted in the report were "...septic tanks, garbage containers, and the feces of waterfowl and domestic animals." Beach water monitoring in the vicinity of the Withers Swash ocean inlet during the summers of 1998, through 2002 confirmed elevated levels of *Enterococcus sp.* following rainfall events. Efforts are underway to eliminate identifiable pollutant inputs and remediate the Withers Swash area.
- B. Agricultural Runoff** - There are no commercial agricultural activities conducted adjacent to the waters of Area 03, and sampling for pesticides and herbicides has not been conducted.
- C. Individual Sewage Treatment and Disposal (ISTD) Systems** - Individual sewage treatment and disposal (ISTD) systems are known to exist in the Withers Swash drainage basin, however, exact numbers and locations have not been documented.
- D. Wildlife and Domestic Animals** - Wildlife in Area 03 consists primarily of birds, small mammals and rodents. These populations, in combination with domestic pet populations, are contributors to nonpoint source
- E. Boat Traffic** - The lack of navigable channels within Area 03 generally precludes watercraft use.
- F. Marine Biotoxins** - During the winter and spring of 1988, South Carolina experienced an occurrence of "Red Tide", specifically *Ptychodiscus brevis* (*G. Breve*), which affected water quality in Horry and Georgetown counties' coastal waters. There has been no documented reoccurrences of this organism at levels requiring emergency response in South Carolina waters subsequent to the 1988 event. The Department participates in a State Task Group on Toxic Algae and operates a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGIC CHARACTERISTICS

¹U.S. Geological Survey, Prepared in cooperation with the City of Myrtle Beach, 1995, *Water-quality in the Withers Swash Basin, with Emphasis on Enteric Bacteria, Myrtle Beach, South Carolina, 1991-1993*: Water Resources Investigations Report 95-4120, 102 p.

PHYSIOGRAPHY

The Withers Swash system is approximately 850 meters in length from it's ocean inlet to it's upper reaches. Maximum width is approximately 200 meters with typical widths being less than 35 meters. Salinities during the review period ranged from 0 ppt to 33 ppt. Mean salinity for the review period was 25 ppt.

Midway Swash is approximately 450 meters in length with an average width of less than 50 meters. Salinities during the review period ranged from 0 ppt to 32 ppt. Mean salinity for the review period was 3 ppt.

TIDES - Tides along the beaches in Myrtle Beach are semidiurnal, consisting of two low and two high tides each lunar day. Mean tidal ranges are 5.06 feet during normal tides and 5.87 feet during spring tides (Tides and Currents for Windows, Version 2.2, Nautical Software Inc.).

PRECIPITATION - Precipitation in Area 03 averages between 50 and 52 inches per year with the heaviest rainfall occurring during the summer months. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall. In September 1999, Hurricane Floyd caused severe flooding throughout Horry County, S. C. Twenty-four hour total rainfall for Myrtle Beach on the day of the storm was approximately 15 inches.

During winter months rainfall is more uniform in nature; heavy, short-term rainfall events are uncommon- yet occasional intense thunderstorms associated with rapidly moving low pressure systems may generate heavy rains. Precipitation rarely occurs in the form of snow or ice, however, low pressure systems infrequently cross Florida and become stationary just offshore of the Georgia coast. Such was the case in late December 1989. This storm system resulted in approximately 14 inches of snow along Horry County's beaches. Spring weather patterns are often extremely dynamic with associated thunderstorms and severe weather conditions.

WINDS - Prevailing winds along the northern portion of the South Carolina coast are from the southwest during spring and south/southwest during the summer. During autumn wind direction is generally from the Northeast. Winter winds fluctuate between Northeast and Southwest. Wind speeds average less than 10 mph, however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes frequently occur.

RIVER DISCHARGES - There are no rivers in close proximity to Area 03. Freshwater input occurs via localized precipitation and resulting runoff.

CURRENTS - Currents are tidally generated, although wind speed and direction may affect current velocities. Flows reverse their direction approximately every six hours.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 03 in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays, and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated data analysis procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station yet provides a six-sample "cushion" (above the NSSP required 30 minimum) for broken samples, lab error, breakdowns, etc. This also allows each annual report to meet the NSSP Triennial Review sampling criteria.

Seventy-two SRS surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from two active water quality sampling stations in Area 03 during the period 01/01/00 through 12/31/02. The samples were collected in 120ml amber glass bottles, immediately placed on ice and transported by bus to the South Carolina Department of Health and Environmental Control's Trident District Environmental Quality Control laboratory at North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. Upon receipt at the laboratory, sample sets that exceeded a 30-hour holding time or contained a temperature control greater than 10 degrees C. were discarded. Samples collected after September 1, 1986 have been analyzed using the five-tube/three dilution modified A-1 method described by Nuefeld (1985²).

Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using automatic temperature compensated refractometers. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of sampling. Tidal stages were determined Nautical Software's Tides and Currents, Version 2.2 (1996).

Each station exceeded a fecal coliform geometric mean mpn /100 ml. value of 88. Additionally, both stations exceeded an estimated 90th percentile fecal coliform mpn/100 ml. value of 260.

CONCLUSIONS

² Nuefeld, N. 1985. Procedures for the bacteriological examination of seawater and shellfish. In: A.E. Greenberg and D.A. Hunt (eds.) Laboratory procedures for the examination of seawater and shellfish, Fifth Edition. American Public Health Association, Washington, D.C. p. 37-63.

Withers Swash and Midway Swash serve as ocean outlets for two of the City of Myrtle Beaches major drainage basins. Although the majority of the city is on municipal sewer service, septic systems are known to be in operation. Nonpoint source runoff from varied pollution sources is the prime contributor to elevated fecal coliform bacteriological levels in the area.

RECOMMENDATIONS

The shoreline reconnaissance and bacteriological data review of shellfish growing Area 03 indicated that the current Restricted classification is appropriate. Due to the excessive estimated 90th percentile values, no depuration activities should be allowed.

Table #1

Shellfish Management Area 03
WATER QUALITY SAMPLING STATIONS DESCRIPTION

<u>Station</u>	<u>Description</u>
01	Withers Swash
02	Midway Swash
(Total 2)	

Figure 1.
Shellfish Management Area 03
Prior Classification

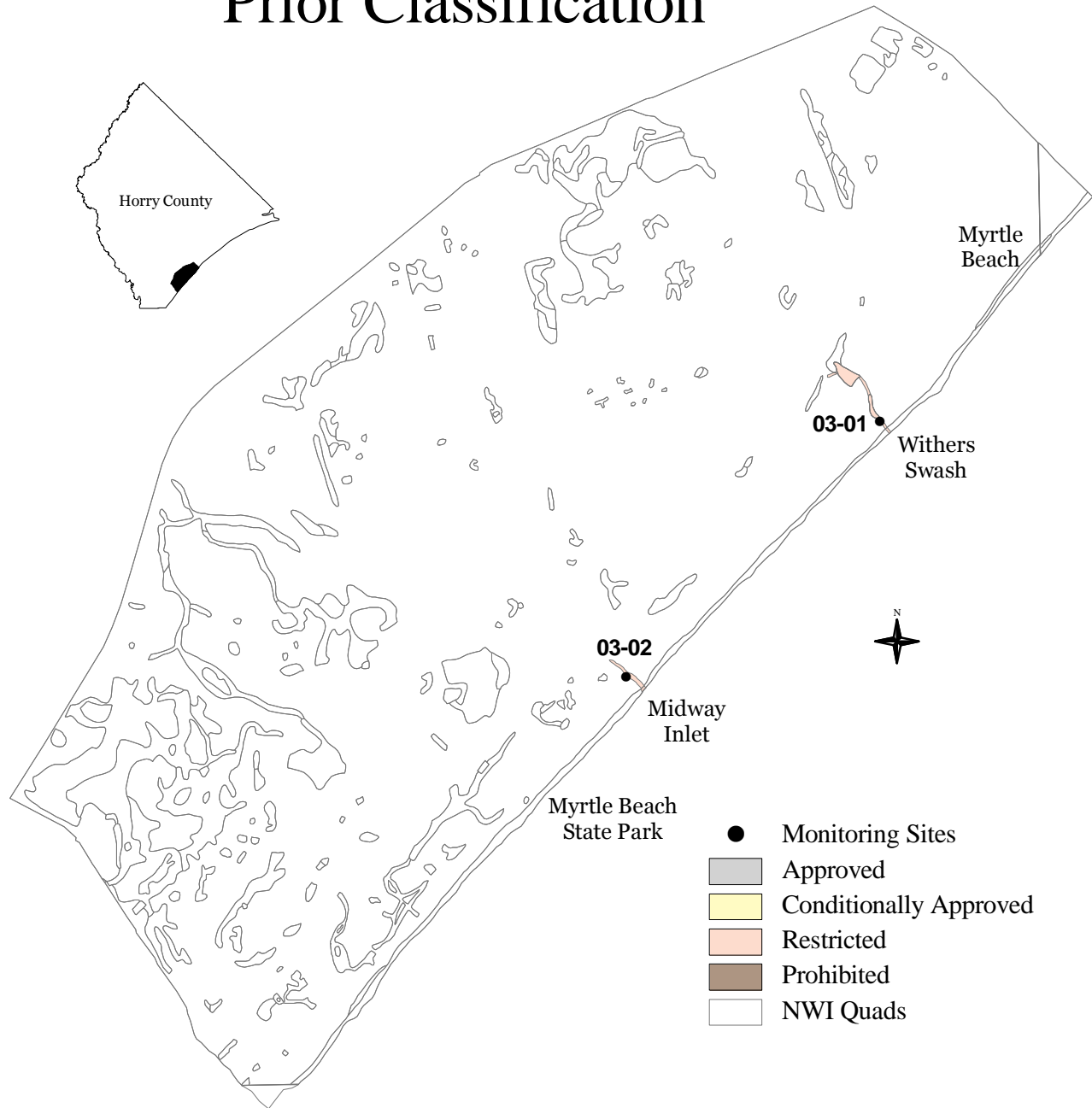


Figure 2. Shellfish Management Area 03 Current Classification

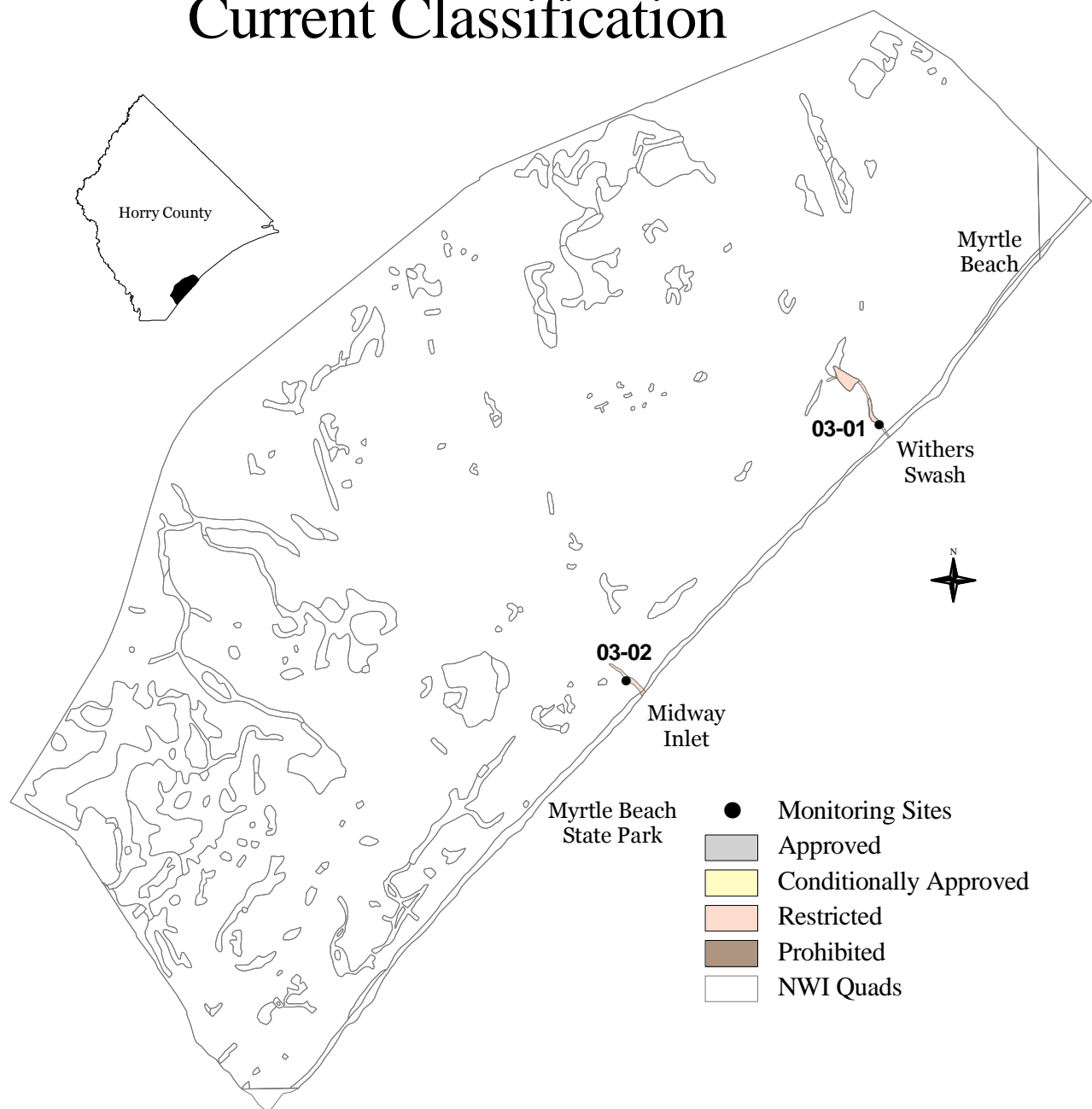


Figure 3. Shellfish Management Area 03 Potential Pollution Sources

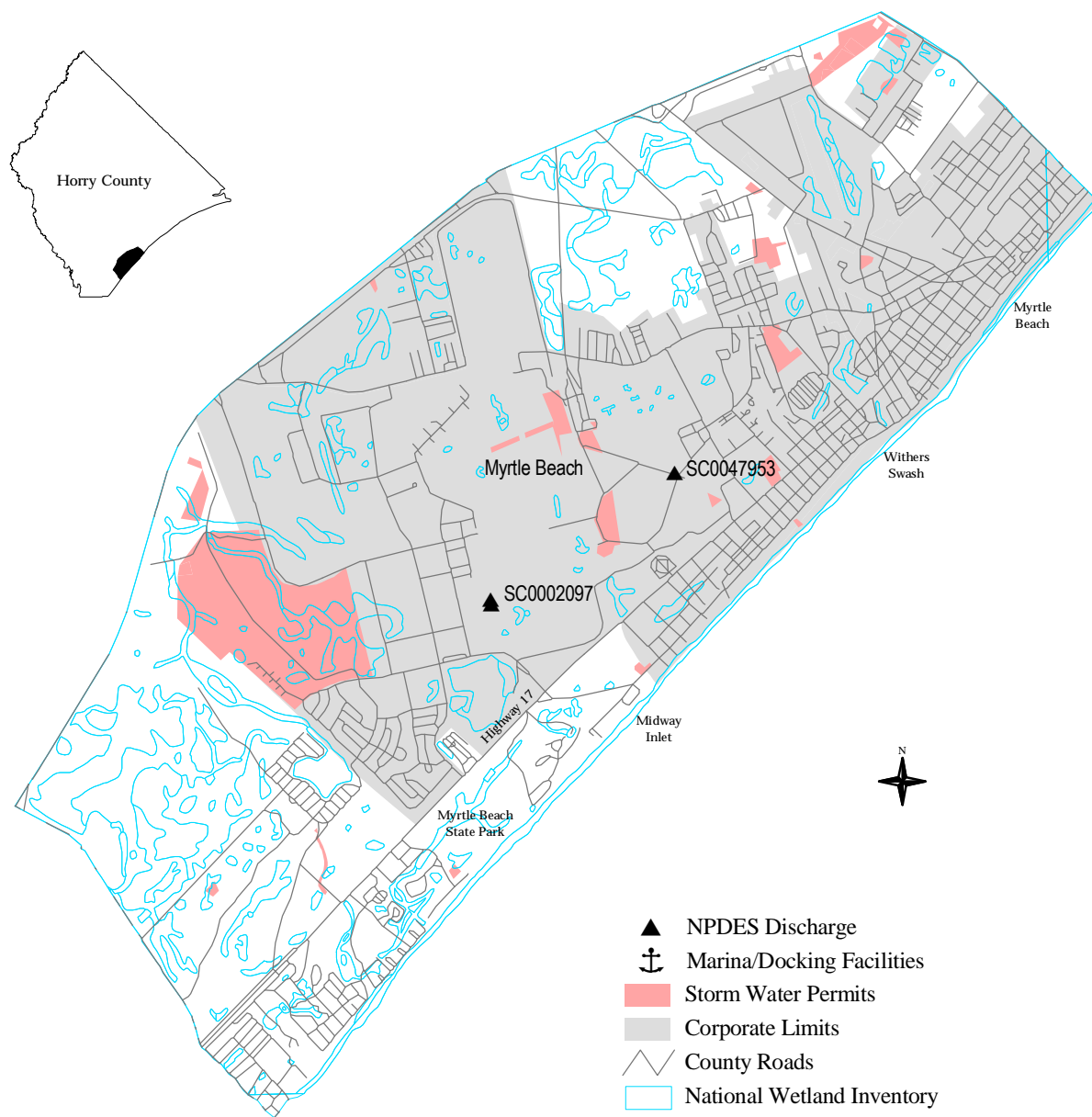


Table #2

Shellfish Management Area 03
FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Sampling Stations

January 01, 1999 thru December 31, 2001

Station # ®	1	2								
SAMPLES	36	36								
GEO MEAN	117.7	153.3								
90TH %ILE	1234	1709								
WATER QLTY	RND	RND								
CLASSIFICATION	R	R								

Station #®										
SAMPLES										
GEO MEAN										
90TH %ILE										
WATER QLTY										
CLASSIFICATION										

Station #®										
Samples										
GeoMean										
90th %ile										
Water Qlty										
Classification										

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** – Prohibited

Water Quality Sampling Stations Data

Shellfish Management Area 03

BACTERIOLOGICAL DATA

Data for each shellfish station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained through South Carolina's Department of Health and Environmental Control - Freedom of Information office at the address below.

Freedom of Information
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

Table # 4

Rainfall Data

Shellfish Management Area 03

SOURCE:

*South Carolina Department of Natural Resources,
Land, Water and Conservation Division,
South Carolina State Climatology Office*

ANNUAL TABLE OF RAINFALL DATA

SOURCE: Department of Natural Resources

Land, Water and Conservation Division

State Climatology Office (Myrtle Beach, SC / Station #2)

2000	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.80	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.10	0.00	0.00	0.00
3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	1.50	0.00	0.00	0.10
4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.40	0.00	0.00	0.00
5th	0.10	0.00	0.20	0.00	0.00	0.50	0.00	0.90	0.70	0.00	0.10	0.00
6th	0.00	0.00	0.00	0.00	0.00	0.90	0.60	0.50	4.50	0.00	0.00	0.00
7th	0.10	0.00	0.00	0.00	0.00	0.00	0.20	0.40	0.10	0.00	0.00	0.00
8th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9th	--	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
10th	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.60
11th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12th	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.00
13th	0.00	0.30	0.00	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00
14th	0.00	0.60	0.00	0.00	0.00	0.00	2.00	1.40	0.00	0.00	0.00	0.10
15th	0.00	0.00	0.00	0.70	0.00	0.00	0.50	0.00	0.00	0.00	0.10	0.10
16th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00
17th	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10
18th	--	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.60	0.00	0.10	0.00
19th	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.50	3.60	0.00	0.30	0.00
20th	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	1.40	0.00
21st	0.00	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22th	0.00	0.00	0.00	0.00	0.00	--	0.90	0.00	1.80	0.00	0.00	0.00
23rd	0.20	0.00	0.00	0.00	0.00	0.30	0.80	0.50	1.50	0.00	0.00	0.00
24th	--	0.00	0.00	0.00	0.00	0.00	3.50	0.50	0.80	0.00	0.00	0.00
25th	1.70	0.00	0.00	0.00	0.00	0.00	2.10	0.20	0.00	0.00	0.10	0.00
26th	0.00	0.00	0.00	0.10	1.30	0.00	0.10	0.30	0.00	0.00	1.40	0.00
27th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28th	0.00	0.10	0.20	0.10	0.00	0.00	0.00	0.10	0.70	0.00	0.00	0.20
29th	--	0.00	0.00	0.10	0.20	0.00	0.50	0.30	0.00	0.00	0.00	0.40
30th	0.20	--	0.10	0.00	0.00	1.10	2.50	0.90	0.00	0.00	0.00	0.00
31st	0.80	--	0.10		0.00	--	0.10	0.20	--	0.00	--	0.00

(Monthly Figures below)

Year's Rainfall Total:

61.20

SUM	3.50	1.00	2.80	2.50	1.50	3.40	15.10	8.80	17.10	0.00	3.60	1.90
MAX	1.70	0.60	1.50	1.00	1.30	1.10	3.50	1.40	4.50	0.00	1.40	0.60
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.13	0.03	0.09	0.08	0.05	0.12	0.49	0.29	0.57	0.00	0.12	0.06

Note: "--" denotes missing data

(Shellfish Management Areas 02 and 03)

ANNUAL TABLE OF RAINFALL DATA

SOURCE: Department of Natural Resources

Land, Water and Conservation Division

State Climatology Office (Myrtle Beach, SC / Station #2)

2001	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.15	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	0.00	0.54	0.87	0.00	0.01	0.00	0.02	0.00
3rd	0.00	0.00	0.61	0.00	0.00	0.00	1.00	0.00	1.34	0.00	0.00	0.00
4th	0.00	0.60	1.24	0.05	0.00	1.02	1.10	0.00	1.65	0.00	0.00	0.00
5th	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.32	0.00	0.00	0.00
6th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7th	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.39	0.00	0.10	0.00	0.00
8th	0.00	0.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	0.00	0.00	0.00
9th	0.24	0.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.01
10th	0.00	0.00	0.03	0.00	0.00	0.01	0.46	0.00	0.00	0.00	0.00	0.01
11th	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12th	0.03	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	2.20
13th	0.50	1.35	1.06	0.00	0.05	--	1.50	0.00	0.00	0.00	0.00	--
14th	0.00	0.00	0.00	0.10	0.00	0.46	0.28	0.35	0.00	0.00	0.00	0.00
15th	0.08	0.00	0.26	0.00	0.00	0.58	0.00	0.09	0.90	0.10	0.00	0.00
16th	0.00	0.00	1.24	0.00	0.00	0.24	0.00	0.00	0.00	0.06	0.00	0.00
17th	0.03	0.03	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00
18th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
19th	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20th	0.03	0.00	0.05	0.00	0.00	0.00	0.66	0.14	0.00	0.00	0.00	0.00
21st	0.02	0.00	2.00	0.00	0.64	0.00	0.00	0.09	0.00	0.00	0.00	0.00
22th	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	1.31	0.00	0.00	0.00
23rd	0.00	0.00	0.00	0.00	0.36	0.10	0.36	0.00	0.00	0.00	0.00	0.00
24th	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.01	0.00	1.10	0.05
25th	0.00	0.00	0.00	0.72	0.00	0.40	0.01	0.04	0.05	0.00	0.66	0.00
26th	0.00	0.00	0.15	0.36	0.00	0.10	0.00	0.00	0.00	0.00	0.03	0.00
27th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28th	0.00	0.10	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00
29th	0.00	--	0.40	0.00	0.05	0.00	0.00	0.00	0.00	0.00	--	0.00
30th	0.00	--	0.60	0.00	0.95	0.00	0.29	--	0.00	0.00	0.02	0.00
31st	0.10	--	0.00	0.00	0.00		0.00		--	0.00	--	0.00

(Monthly Figures below)

Year's Rainfall Total:

40.51

SUM	1.03	2.80	7.66	1.23	2.10	6.11	8.29	1.10	5.75	0.26	1.83	2.35
MAX	0.50	1.35	2.00	0.72	0.95	1.20	1.50	0.39	1.65	0.10	1.10	2.20
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.03	0.10	0.25	0.04	0.07	0.21	0.27	0.04	0.19	0.01	0.06	0.08

Note: "--" denotes missing data

(Shellfish Management Areas 02 and 03)

ANNUAL TABLE OF RAINFALL DATA

SOURCE: Department of Natural Resources

Land, Water and Conservation Division

State Climatology Office (Myrtle Beach, SC / Station #2)

2002	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.22	0.70	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
3rd	0.49	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4th	0.15	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5th	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.80	0.00	0.00	0.10	0.00
6th	0.26	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.10	0.00	0.00	0.40
7th	0.82	1.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8th	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
9th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
10th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
11th	0.00	0.30	0.00	0.03	0.90	0.00	0.00	0.00	0.00	0.35	0.10	0.97
12th	0.00	0.00	0.00	0.03	0.19	0.00	1.48	0.00	0.00	0.25	1.30	0.97
13th	0.38	0.00	0.52	0.00	0.00	0.00	0.01	0.00	0.00	0.00	1.35	0.30
14th	0.01	0.00	0.00	0.00	1.20	0.00	0.25	0.00	0.05	0.00	0.05	0.50
15th	0.50	0.00	0.00	0.00	0.00	0.30	0.24	2.20	0.40	0.30	0.00	0.00
16th	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.04	0.35	0.00	0.00
17th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00
18th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.02	0.00
19th	0.00	0.00	0.00	0.00	0.50	0.35	0.00	0.28	0.15	0.00	0.00	0.00
20th	0.12	0.00	0.00	0.00	0.05	0.10	0.00	0.05	0.00	0.00	0.00	0.20
21st	0.00	0.07	0.00	0.00	0.00	0.27	2.30	0.00	0.00	0.00	0.00	0.00
22th	0.08	0.00	0.10	0.00	0.00	0.19	0.02	0.00	0.00	0.20	0.00	0.00
23rd	0.00	0.00	0.00	0.00	0.00	1.54	1.75	0.00	0.00	0.30	0.00	0.00
24th	0.05	0.00	0.00	0.00	0.00	0.05	0.06	0.00	0.96	0.05	0.00	1.20
25th	0.08	0.00	0.00	0.00	0.00	0.03	0.03	1.10	0.00	0.00	0.00	0.00
26th	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.23	1.50	0.00	0.00	0.00
27th	0.00	0.00	0.20	0.00	0.00	0.02	0.00	0.10	0.01	0.20	0.00	0.00
28th	0.00	0.00	0.00	0.05	0.00	0.40	0.00	1.30	0.00	0.01	0.00	0.00
29th	0.00		0.00	0.00	0.03	0.00	0.00	1.16	0.00	0.00	0.00	0.00
30th	0.00		0.00	0.00	0.01	0.00	0.00	2.00	0.00	0.04	0.00	0.00
31st	0.00		0.00		0.00		0.00	0.36		0.00		0.00

(Monthly Figures below)

Year's Rainfall Total:

45.77

SUM	2.94	2.32	2.12	0.89	3.15	3.25	6.82	10.05	3.93	2.09	3.42	4.79
MAX	0.82	1.65	1.30	0.42	1.20	1.54	2.30	2.20	1.50	0.35	1.35	1.20
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.09	0.08	0.07	0.03	0.10	0.11	0.22	0.32	0.13	0.07	0.11	0.15

Note: "--" denotes missing data

(Shellfish Management Areas 02 and 03)